CLAIMS:

1. An audio and vibration transducer comprising:

a transducer motor for generating movement in response to an electrical signal;

a first member coupled to the transducer motor, the first member having a surface in contact with an ambient acoustic medium for exciting sound waves in the ambient acoustic medium as the first member is moved by the transducer motor;

a resilient support characterized by a compliance;

a second member supported by the resilient support and coupled to the transducer motor, wherein the second member is characterized by a mass;

wherein the compliance of the resilient support, and the mass of the second member determine a resonant oscillation that is characterized by a center frequency that is located between a first note on a musical scale, and a second note on the musical scale that is directly adjacent to the first note on the musical scale.

2. The audio and vibration transducer according to claim 1 wherein:

the resonant oscillation is further characterized by a vibration frequency response, as measured by attaching the transducer to a mass of 100 grams that is suspended by a wire of 50 centimeters, such that an axis of motion of the transducer is perpendicular to the wire, such that a response of the transducer at the first note and a response of the transducer at the second note, are each at least 6 dB lower than a response of the transducer at the center frequency, wherein the response is measured in terms of peak acceleration.

3. The audio and vibration transducer according to claim 2 wherein:

the response of the transducer at the first note and the response of the transducer at the second note are between 7.5 and 10 dB below the response of the transducer at the center frequency.

4. The audio and vibration transducer according to claim 1 wherein:

the second member comprises one or more magnetized bodies, and an annular gap across which a magnetic field crosses; and

the transducer motor comprises a cylindrical sleeve coupled to the first member, and a solenoid wound on the cylindrical sleeve.

5. The audio and vibration transducer according to claim 1 wherein:

the first member comprises a speaker cone.

6. A transducer comprising:

a mechanical resonator that exhibits a resonance characterized by a Q, and a center frequency, wherein the center frequency is located between a first note on a musical scale, and a second note on the musical scale that is directly adjacent to the first note, and the Q of the mechanical resonator is sufficiently high so that, the center frequency in combination with the Q results in a relative response of the mechanical resonator at each of the first note and the second note that is at least 6 dB below a relative response of the mechanical resonator at the center frequency.

7. An apparatus comprising the transducer recited in claim 6 and further comprising:

one or more electrical circuits for applying drive signals to the transducer that include musical melodies, and vibration drive signals for exciting the resonance.

8. The transducer according to claim 6 further comprising:

a piezoelectric transducer motor.

9. The transducer according to claim 6 wherein:

the mechanical resonator comprises:

a beam including a first end adapted for securing to a mounting boss and a second end; and

a mass attached to the second end of the beam.

10. The transducer according to claim 9 wherein the beam comprises a piezoelectric material.

11. The transducer according to claim 6 comprising:

a solenoid; and

a magnetized ferromagnetic member located proximate the solenoid.

12. A method of operating a multifunction transducer, the method comprising:

applying a first signal component that has substantial signal power in a frequency range that is substantially centered between a pair of adjacent notes of a musical scale, to a multifunction transducer that exhibits a resonance in the frequency range;

applying a second signal component to the multifunction transducer.

13. The method of operating a multifunction transducer according to claim 12 wherein applying the second signal component comprises:

applying a signal component that consists essentially of notes on the musical scale.

14. The method of operating a multifunction transducer according to claim 12 wherein applying the second signal component comprises:

applying audio electrical signals.

15. The method of operating a multifunction transducer according to claim 12 wherein:

applying the first signal component comprises applying a signal component that includes spectral power at frequencies that are detectable by tactile sense, at a power level sufficient to excite resonance of the multifunction transducer of sufficient amplitude to be detected by tactile sense.

16. The method of operating a multifunction transducer according to claim 12 wherein:

applying the first signal component comprises applying a signal component that consists essentially of spectral power in the range of 120 Hz to 180 Hz.

17. The method of operating a multifunction transducer according to claim 12 further comprising:

processing a first digital data structure that includes the first signal component and the second signal component in digitally encoded form to extract the first signal component and the second signal component.

18. The method of operating a multifunction transducer according to claim 17 wherein processing the first digital data structure comprises:

parsing the first digital data structure to extract a second data structure that includes the first signal component in digitally encoded form, and a third data structure that includes the second signal component in digitally encoded form;

processing the second data structure to extract the first signal component; and

processing the third data structure to extract the second signal component.

19. The method of operating a multifunction transducer according to claim 18 wherein:

parsing the first digital data structure comprises parsing an XMF file; and

parsing the second data structure comprises parsing a MIDI file.

20. The method according to claim 19 wherein processing the third data structure comprises:

decompressing a compressed audio file.

21. A portable electronic apparatus comprising:

a multifunction transducer that is characterized by a resonance at a center frequency that is located within 10% of a difference between frequencies of a pair of adjacent musical notes on a musical scale, from an average frequency of the pair of adjacent musical notes;

a transducer drive circuit coupled to the multifunction transducer for applying drive signals to the multifunction transducer in response to input data;

a processor coupled to the transducer drive circuit for applying input data to the transducer drive circuit, wherein the processor is programmed to:

read one or more data structures that include digitally encoded drive signals for the multifunction transducer; and

apply a sequence of input data to the transducer drive circuit in order to cause the drive circuit to drive the transducer.

22. The portable electronic apparatus according to claim 21 further comprising:

a wireless communication transceiver coupled to the processor;

wherein the processor is further programmed to respond to received wireless communication signals by:

reading the one or more data structures that include digitally encoded drive signals for the multifunction transducer; and

applying the sequence of input data to the transducer drive circuit in order to cause the drive circuit to drive the transducer.

23. The portable electronic apparatus according to claim 21 wherein:

the multifunction transducer is characterized by a resonance at a center frequency between 120 and 180 Hz.

24. The portable electronic apparatus according to claim 21 wherein:

the multifunction transducer that is characterized by a resonance at a center frequency that is between two adjacent musical notes on a western musical scale.